GENERAL NOTES

1. This guide specification is to be used in the preparation of contract specifications in accordance with the Sacramento District Specification Manual. It will not be made a part of a contract merely by reference; pertinent portions will be copied verbatim into the contract documents.

2. The capital letters in the right hand margins indicate that there is a technical note pertaining to that portion of the guide specification. It is intended that the letters in the margins be deleted before typing the project specifications.

3. Where numbers, symbols, words, phrases, clauses, or sentences in this specification are enclosed in brackets [ ], a choice or modification must be made; delete inapplicable portion(s) carefully. Where blank spaces occur in sentences, insert the appropriate data. Where entire paragraphs are not applicable, they should be deleted completely.

TECHNICAL NOTES

A. The section number shall be inserted in the specification heading and prefixed to each page number in project specifications.

B. This guide specification is intended for use on Air Force projects where Local Area Network (LAN) is not involved. Facilities will be provided with prewire telephone systems in accordance with AFR 88-15, Chapter 18, Section C (Revised). Non-administrative facilities with minimal telephone requirements of 25 lines/channels or less may use only backboards with conduit raceways. Telephone instruments, electronic key switches or Electronic Private Automatic Branch Exchange (EPABX) will be provided by others.

C. Paragraph 1: The listed designations for publications are those that were in effect when this guide specification was being prepared. These designations are updated when necessary by District Instruction, and references in project specifications need be no later than in the current District Instruction for this guide specification. To minimize the possibility of error, the letter suffixes, amendments, and dates indicating specific issues should be retained in paragraph 1 and omitted elsewhere in the project specification.

D. Paragraph 4.1: Complete cable and wiring schedule shall be indicated on the drawings to allow for inspection by the Contracting Officer and

terminating/testing by the Contractor of all cable terminations.

E. Paragraph 5.1.2: Option for shielding of inside wiring cable, designer shall coordinate with user for specific requirements.

F. Paragraph 5.2: Provide protectors unless User states otherwise. Some facilities may require different type protectors. Designer shall provide appropriate specifications based on information furnished by cognizant Information Services Office or their Engineering Support Agency. If protectors are not required, terminate cable directly to incoming cable blocks.

G. Paragraphs 5.3 and 6.3.2: Unaccompanied Enlisted Personnel Housing (UEPH) and Unaccompanied Officer Personnel Housing (UOPH) facilities shall use single modular 8-pin jack and wired with a 2-pair (4 conductor) cable or two 8-pin modular jacks in a housing, to be provided with one outlet per sleeping room.

H. Paragraph 6.1.1: Designer shall delete paragraph 7.2.8 of OCE Guide Specification (Spec) CEGS-16415, Electrical Work, Interior.

I. Paragraph 6.1.2: Fire alarm systems many times use the telephone for the system for transmission of fire alarm signals. Coordinate with the fire alarm requirements. Delete this paragraph where radio transmission is used.

J. Paragraph 6.2: Use underground entrance wherever practicable. Aerial entrance will be used only, when, for architectural reasons, and an underground entrance can not be implemented. Conduits shall be terminated approximately 10 feet from building only if the base telephone cable system is "direct buried" or if requested by the base n writing. Otherwise, extend conduits to the closest approximate pole or manhole as applicable. Designer shall coordinate paragraph 18 of OCE Guide Spec CEGS-16415. Provide 2-4" conduits (one spare) from the Tele-communication manhole to the Communication Equipment Room (CER). The manhole will be as specified by the Base Communication Group and as shown on Electrical Utility Site Plan. On the Electrical Utility Site Plan the designer shall show the point of service, entrance raceway, manholes/pull boxes/poles with required construction details on plan, and shall show all outlet locations with each clearly identified. Provide filled telephone cable with pair quantity as specified by the Base Communication Group. Terminate the conduits at the Entrance Service Background location below the left portion of the board for slab construction, or above the left portion of the backboard for basement locations.

K. Paragraph 6.3.4: All exterior telephone cables of 25-pairs and larger must be sliced using AT & T technologies 710 Modular Splicing System or approved equal.

L. Paragraph 6.5: Designer shall provide a block diagram when facility requires more than one CCC and shall show each terminal location (CER, CCCs) with the required conduit size interconnections on the drawings. On a detail sheet, the designer shall show scaled elevations of all typical backboards showing relative locations of conduits, connecting blocks, protectors, splice case and dedicated duplex power outlets.

M. Paragraph 6.5.2: Delete "(future)" unless the building entry cable is installed "by others" and "by others" is verified through Major Command on a base by base or a case by case basis. Designer must edit specifications appropriately.

N. Paragraph 6.5.3: For larger facilities, a distribution frame (either wall or floor mounted) is required. In such a case, the outside telephone cables are to be terminated on this frame with central office type connectors and the main interior cables shall be terminated on MDF type terminal blocks (or approved equal) instead of 6683-50 type terminal blocks.

O. Paragraph 6.5.4: For UOPH and UEPH use (8-pin jack) wired with a 2-pair 4-conductor cable or two 8-pin modular jacks in a housing unless user states otherwise.

P. Paragraph 6.6: Two duplex power receptacles on a 20-amp dedicated circuit are required near each backboard. Installation should be provided under section ELECTRICAL WORK, INTERIOR. Verify that the receptacle location does not conflict with the backboard installation. Receptacles should not be located on backboards or in telephone cabinets. AFCC Bulletin No. TB 86-07-EZ (30 May 1986) requires lining the CER with plywood. Permission to deviate, if desired, must be obtained in writing from the using agency.

SECTION 16710

TELEPHONE SYSTEM-PREWIRE

PART 1 - GENERAL

1. REFERENCE PUBLICATIONS: Some or all of the publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications shall govern.

1.1 National Fire Protection Association (NFPA) Publications:

No. 70-1984	National Electrical Code

1.2 Federal Communications Commission (FCC) Rules and Regulations:

Part 68 10 Oct 1983	List of Material Acceptable the Telephone Network

1.3 Rural Electrification Administration (REA) Bulletin and Specification:

Bulletin 344-2 Apr 1983. Suppl. thru Nov. 1984	List of Materials Acceptable for Use on Telephone Systems of REA Borrowers
Bulletin 345-6 PC-2, Jan 1978	REA Standard for Splicing Plastic Insulated Cables
Bulletin 345-63, PC-4, May 1976	REA Standard for Acceptance Tests and Measurements of Telephone Plant
Bulletin 345-13 PE-22, Jan 1983	REA Specification for Aerial and Under- Ground Cables
Bulletin 345-29 PE-38, Feb 1982	REA Specification for Self Supporting Cable
Bulletin 345-67 PE-39, Nov 1981	REA Specifications for Filled Telephone Cables
Bulletin 345-83, PE-80, July 1979	REA Specification for Gas Tube Surge Arresters

Bulletin 345-87 PE-87	REA Specification for Terminating Tip Cables
Bulletin 345-89 PE-89, Oct 1982	REA Specifications for Filled Telephone Cable with Expanded Insulation

1.4 American National Standards Institute, Inc. Standard:

C2-1984	National Electrical Safety Code

1.5 Insulated Cable Engineers Association (ICEA) Publication:

S-80-576 Sep 1983	Telecommunications Wire and Cable for Wiring of Premises

1.6 Underwriters Laboratories Inc. (U.L.) Publication:

910-85 Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air-Handling Spaces, Test Method for

1.7 Institute of Electrical and Electronics Engineers (IEEE) Publication:

No. 587-1980 Guide for Surge Voltages in Low-Voltage AC Power Circuits

2. GENERAL REQUIREMENTS:

2.1 Rules: The installation shall conform to the requirements of NFPA 70 and ANSI C2.

2.2 Verification of Dimensions: The Contractor shall become familiar with the details of the work, shall verify dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing any work.

2.3 Standard Products: Materials and equipment shall be new and the standard products of a manufacturer regularly engaged in the manufacture of the products. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least 2 years prior to bid opening.

2.4 Workmanship: All materials and equipment shall be installed in accordance with recommendations of the manufacturer to conform with the contract documents. The installation shall be accomplished by workmen skilled in this type of work.

2.5 Delivery and Storage: Material shall be delivered in unopened original containers plainly labeled with the manufacturer's names and brands. Equipment placed in storage shall be protected from any damage or degradation in performance due to the storage environment.

2.6 Prevention of Corrosion: All metallic materials exposed to the weather shall be protected against corrosion.

2.7 Nameplates: Each major component of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the equipment.

2.8 Power Line Surge Protection: All equipment power supplies shall be protected from power line surges. Equipment shall meet the requirements of

IEEE No. 587. Protection shall be provided near equipment in a separate metallic enclosure at ground potential and as necessary at the power panel to insure protection against surges.

3. SUBMITTALS:

3.1 Shop Drawings: The Contractor shall submit, for approval, shop drawings for the items listed below and for any other items as directed by the Contracting Officer. Submittals shall be made in accordance with paragraph SUBMITTALS of the SPECIAL CLAUSES.

Telephone Outlet
Cable
Connecting Blocks
Protection Modules

3.2 Qualifications of Cable Splicers: Before assigning any cable splicer to any work, the Contractor shall provide the contracting Officer with the name(s) of the cable splicer(s) to be employed, together with satisfactory proof that each splicer has had at least three years experience in splicing telephone cables and is experienced with the type and rating of the cables to be spliced. In addition, each cable splicer may be required to make an approved dummy splices of each type to be employed in the execution of this contract in the presence of the Contracting Officer. Splices shall be in accordance with the cable manufacturer's instructions. All material for dummy splices shall be furnished by the contractor.

3.3 As-Built Drawings: In addition to the requirements of paragraph "AS-BUILT DRAWINGS" of the SPECIAL CLAUSES, the contractor shall provide a complete as-built set of applicable cable wiring schedules after terminating and testing by the Contractor, and outlet floor plans at each terminal locations(s); ***** Telephone Cabinet (TC), ***** Cross-Connect Closet-(CCC), ***** Communication Equipment Room-(CER). These drawings for the ***** TC, ***** CCC, ***** CER shall be reduced and placed in, but removable from, a wall mounted bracket, and will be located as directed by the Contracting Officer. Additionally, two sets of each drawing shall be turned over to the Contracting Officer. The Cable Wiring Schedule (CWS) drawings shall list the originating point (eg. Outlet or connecting block terminals) of each conductor pair on the left, the cable identification and conductor pair identification in the center, and the conductor pair connecting block termination on the right. Each Terminal Cabinet (TC), Cross Connect Closet (CCC), Communications Equipment Rooms (CER), or backboard locations shall have two sets of cable schedules. One schedule for each outgoing and incoming cables. Each group of cable schedules shall start at the upper left corner of each block group of cable schedules shall start at the upper left corner of each block group and continue

the sequence. On the drawings, the cable schedules for a particular room/area shall start with the outgoing block group then followed by the incoming block group. The order for presenting locations of cable schedules shall start at the TC of CCC closest to the outlet and progressing toward the CER.

4. SYSTEM REQUIREMENTS:

4.1 Description: The Prewired Telephone System shall consist of raceways, junction and pull boxes, protectors for incoming cable with splice box, duplex outlets and cover plates, backboards in areas provided, terminal blocks and wiring as indicated on the drawings.

PART 2 - PRODUCTS

5. MATERIALS AND EQUIPMENT: Materials and equipment shall conform to REA Bulletin 344-2 and to the following requirements:

5.1 Telephone Cable: Solid copper conductors, No. ***** 19 ***** 22 ***** 24 ***** or ***** 26 AWG, types as follows:

5.1.1 Underground: ***** Filled telephone cable, type PE-39. ***** Filled telephone cable with expanded insulation, type PE-89. ***** Air coil telephone cable, type PE-22.

5.1.2 Inside wiring cable shall comply with ICEA S-80-576.

5.1.2.1 Inside cable shall be single jacketed with color coding.

***** 5.1.2.2 Plenum cable shall be single jacketed with color coding, conform with NFPA 70, NEC 300-22 and U.L. 910 approved for use in plenums without conduit.

***** 5.1.2.3 Riser cable shall comply with NFPA 70, NEC 300-21 and U.L. 910.

***** 5.1.3 Aerial: Figure 8 Distribution Wire, ***** PE-38.

5.1.4 Service Cable: Building entrance cable shall be ***** -pair type ***** PE-39 ***** PE-89 filled telephone cable.

5.2 Protectors: Protector blocks shall incorporate gas tube surge arresters, PE-80.

5.3 Telephone Outlets: Telephone outlets shall be of modular type, ***** 6-pin jack assemblies mounted in a duplex housing ***** two 8-pin modular jacks in a housing ***** single 8-pin jack. Each modular jack shall accept ***** four ***** two wire pairs and each outlet shall be numbered for easy identification of type and location. The modular jack assembly shall comply with FCC Rules and Regulations Part 68, Subpart F.

PART 3 - EXECUTION

6. INSTALLATION:

6.1 General: Raceways shall be installed as specified in section ELECTRICAL WORK, INTERIOR, ***** UNDERFLOOR DUCT SYSTEM, ***** UNDERFLOOR RACEWAY SYSTEM (CELLULAR STEEL FLOOR) ***** and ***** ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND. Raceways shall allow sufficient space for cables to be installed without compromising the cable manufacturer's recommended minimum bending radii. Raceway fill shall not exceed 40 percent.

6.1.1 Communications Raceways: Communications raceways indicated shall be installed in accordance with the previous requirements for conduit and tubing and with the additional requirements that no length of run shall exceed 50 feet for 3/4-inch sizes, and 100 feet for 1-inch or larger sizes, and shall not contain more than two 90-degree bends or the equivalent. Additional pull or junction boxes shall be installed to comply with these limitations whether or not indicated. Inside radii of bends in conduits of 3/4-inch size shall not be less than 4-1/2 inches and 1-inch size or larger shall not be less than ten times the nominal diameter.

6.1.2 Fire Alarm Connections: The Contractor shall provide 4-pair telephone cable between the telephone backboard and the fire alarm system transmitter. Raceway shall be provided under section FIRE DETECTION AND ALARM SYSTEM and as indicated on the drawings.

6.2 Building Entry: ***** Conduits for underground telephone cable shall be installed as indicated in section ELECTRICAL WORK, INTERIOR. ***** Conduit shall terminate with a vertical riser at the pole indicated. For vertical risers on poles, conduit shall be secured at intervals not exceeding 10-feet and within 12-inches of each side of any bend or termination. ***** Conduit shall terminate approximately 10-feet outside the building wall and 2-feet below finished grade with the outside ends bushed and plugged or capped and clearly marked.

6.3 Cable: All telephone cable shall have the number of insulated twisted pairs as indicated or as shown on the drawings. All telephone cable shall be installed in raceways unless otherwise indicated on the drawings.

6.3.1 Guaranteed Pairs: All pairs in each cable shall be usable. All conductors for the incoming and tie cables shall be usable except those identified as defective by the manufacturer.

6.3.2 Station Cables: The contractor shall provide ***** 2 ***** 4 ***** 6 ***** or ***** 8 - pair inside wiring cable in raceway unless otherwise indicated on the drawings. All pairs on each outlet shall be workable.

6.3.3 Tie Cables: The Contractor shall provide ***** 25, ***** 50, --pairs inside wiring cable in conduit between the Communications Equipment Room (CER) and each Cross-Connect Closet (CCC) as indicated on the drawings. A minimum of two spare 3-inch conduits with pull wires shall be provided between each room.

6.3.4 Splices: Splicing shall be in accordance with REA Bulletin 345-6, PC-2. All pairs shall be spliced. All outside cable splices shall be watertight. Cable shields shall be bonded together at all cable splices with

bonding harness to maintain sheath continuity. ***** Splices shall be grounded to the manhole grounding system in accordance with paragraph GROUNDING.

6.4 Cable Installation: Cables shall be handled and placed in such a manner as to avoid kinks and other shield deformities. Cable kinked or flattened shall not be installed. Lead sleeves or duct splices shall not be permitted. Cable racks and hooks shall be installed in manholes to support installed cables. All outdoor connections shall be weatherproof through the use of weather boots or other approved methods. ***** All aerial cable entrances into buildings shall have drip loops. All filled cable splice points in underground facilities shall be encapsulated using reenterable type splice cases and encapsulant compound. ***** All air core cable splice points shall be sealed in an air tight pressure type splice case and shall be tested with 15 PSI backpressure to insure there are no leaks.

6.4.1 Duct Sealant: After cable has been placed, each lateral duct at the building, each entrance and exit duct in each manhole, and each riser and pedestal location shall be sealed. Compounds for sealing ducts and conduit shall have a putty-like consistency workable with the hands at temperatures as low as 35 degrees F., and shall not harden materially when exposed to the air. Compounds shall readily calk or adhere to clean surfaces of plastic or metallic raceways, cable shields, jackets, covers, or insulation. Compounds shall form a seal without dissolving, noticeably changing characteristics, or removing any of the ingredients. Compounds shall have no injurios effect upon the hands of workmen or upon materials.

6.4.1.1 Firestopping: Penetrations through fire rated walls and floors must be firestopped in accordance with NFPA 70, NEC 300-21.

6.4.2 Cable Tags: Embossed lead cable tags shall be placed on all cables on each side of each splice. Each tag shall be stamped to indicate the cable size, gauge, cable number, and the number of the first and last pair of each group of consecutive pairs which is in the main cable, stub cable, or branch cable to which the tag is attached.

6.5 Terminations:

6.5.1 General: All inside wiring cable shall be numbered, terminated, and tagged at both ends to provide permanent identification. Station cables not installed in raceway shall be properly secured. Termination at each distribution point shall be made on type 66 terminal blocks.

6.5.2 Building Entry Blocks: Building Entry Protection Modules equipped with gas tube surge arresters shall be provided in the CER to terminate the ***** (future) building entrance cable.

***** 6.5.2.1 Station Protection for Remote Stations: Protectors shall be provided to protect stations located in remote buildings.

6.5.3 Connecting Blocks: Type 66 connecting blocks shall be provided ***** at the telephone backboard ***** in the CER ***** and in each CCC to terminate and crossconnect all lines. Blocks shall be 66B3-50 type to terminate and crossconnect all lines. Blocks shall be 66B3-50 type to terminate 50-pairs of wires each. Connecting blocks shall be stenciled to indicate cable number and cable pairs using black marking on a white designation strip. Crossconnects ***** within CER and CCC ***** at telephone backboards will be provided by others.

6.5.4 Telephone Outlets: Termination at each respective outlet shall be made on ***** 2 ***** 4 ***** 6 ***** or ***** 8-pin modular jacks as indicated. Where outlets have been designated for wall phones, "Lug Type" faceplate connectors shall be provided. The completed installation shall meet or exceed industry standards for "Flush Mount" terminals and connectors. All outlets shall be duplex type (two modular jacks) unless otherwise indicated.

6.6 Telephone Backboard: ***** The CER shall be lined with 3/4-inch plywood. ***** Telephone backboards shall be installed as indicated on the drawings. Plywood shall be finished with two coats of insulating varnish.

7. GROUNDING:

7.1 General: Except where specifically indicated otherwise, all exposed non-current carrying metallic parts of telephone equipment, cable shields, and terminals shall be grounded as described in section ELECTRICAL WORK, INTERIOR.

7.2 Terminals: No. 6 AWG copper grounding conductor shall be provided to the ***** CER ***** telephone backboard ***** and radially extended to each CCC. The grounding conductor shall be continuous from the grounding electrode system provided under section: ELECTRICAL WORK, INTERIOR. Protector blocks shall be grounded with No. 6 AWG copper conductor to the grounding conductor.

***** 7.3 Manholes: A soft tinned copper, 3/8-inch wide by 1/16-inch thick bonding ribbon shall be used to ground all splices to the manhole ground system. Bonding ribbon shall be attached to the manhole walls on 18-inch centers with bonding ribbon clamps.

***** 7.3.1 Bonding ribbon clamps shall be attached to walls of the manhole using 1/4-inch x 1 inch hammer drive anchors.

8. REPAIR OF EXISTING WORK: The work shall be carefully laid out in advance, and where cutting, channeling, chasing, or drilling of floors, walls,

partitions, ceiling or other surfaces is necessary for the proper installation, support, or anchorage of the conduit or raceway, this work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involoved, at no additional cost to the Government.

9. TESTS: The Contractor shall notify the Contracting Officer 21 days before the acceptances tests are to be conducted. Acceptance tests shall be developed by the Contractor to verify that installed cablea are free from shorts, crosses, opens, grounds, and splits, and that the integrity of the insulation has been maintained. Testing shall be performed in the presence of the Contracting Officer. The Contractor shall furnish all instruments and personnel required for the tests. The Contractor shall record all test data and shall furnish a record copy to the Contracting Officer.

9.1 Cable Tests: Cable tests shall be performed with all cables (except cross-connects) are in place. The attached Cable Status Certificate form shall be used to document cable tests. Testing shall be performed in accordance with REA Bulletin 345-63, PC-4 for Shield Continuity, Conductor Insulation Resistance, and DC Loop Resistance Measurements. All defective pairs, except those noted as defective by the manufacturer in accordance with the applicable cable specifications, shall be made good by the contractor.

10. CONSTRUCTION QUALITY CONTROL: Attention is directed to SECTION: CONSTRUCTION QUALITY CONTROL which requires the Contractor to perform quality control inspection, testing, and reporting.

* * * * *

- REMINDER -

Located at the front of these specifications
are the Contract Clauses, Special Clauses
and Division I GENERAL REQUIREMENTS of the
Technical Specifications, which apply to every
aspect of this contract including the work in
this section whether performed by Prime
Contractor, subcontractor, or supplier